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Critical review of recent studies investigating effects of word processing-assisted writing and pen-and-paper writing on the quality of writing and higher level revisions

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Abstract

This paper presents a critical review on studies that compared the effects of word processing-assisted writing and pen-and-paper writing on the quality of writing and higher level revisions. I argue that, the mixed results can be attributed to flaws in the research design, including forcing students who were skilled in writing with computers to compose with pen and paper during the data collection, using thinking-aloud protocols for evaluation, and failing to state the time limit for and the venue of conducting the writing task. I conclude by suggesting directions for future research.

Keywords: Word processing-assisted writing; Pen-and-paper writing; Writing quality; Higher level revisions

1. Introduction

Studies that compare composing processes and written products in timed writing assignments between computer and paper-and-pen modes have been quite popular for the past twenty years. In this paper, I give a summary of the studies pertinent to the investigation of computer-delivered and paper-based modes of writing in affecting students' higher-order thinking, higher-level revisions, as well as the quality of writing. I conclude by suggesting directions for future research.

2. Critical review of studies concerning word processing-assisted writing and pen-and-paper writing

In the last two decades, we have witnessed a number of research studies comparing the effects of word processing-assisted and pen-and-paper writing modes on the quality of writing and higher-level revisions. Word processors typically include functions such as spelling and grammar checking, formatting, block deleting, block moving, storage of information, and thesaurus, which help students edit and revise their written work. Over the years, the research studies have yielded mixed results. One set of studies has compared the use of word processing and pen-and-paper in composing. It has revealed that students who used computers to compose their essays exhibited work of higher quality compared with those writing in pen-and-paper (Bernhardt, Wojahn, & Edwards, 1989; Kitchin, 1991; Lam & Pennington, 1995; Lee, 2004; Li, 2006; Li & Cumming, 2001; Owston, Murphy, & Wideman, 1992; Owston & Wideman, 1997; Sommers, 1985; Williamson & Pence, 1989). However, some other research studies have shown that the quality difference of writing produced by computer-assisted and traditional

pen-and-paper modes was insignificant (Dalton & Hannafin, 1987; Hawisher, 1987; Kurth, 1987; Lee, 2002; Lichtenstein, 1996; Teichman & Poris, 1989).

Another set of studies has compared the effects of word processors and pen-and-paper on students' higher-level revisions. Of the 14 studies included, eight studies (Bernhardt, Edwards, & Wojahn, 1989; Daiute, 1985; Dalton & Hannafin, 1987; Frase, Kiefer, Smith, & Fox, 1985; Johnson, 1988; Li, 2006; Li & Cumming, 2001; McAllister & Louth, 1988) show that word processors lead to more effective *higher level-revisions*, which refer to "revisions at or above the phrase level" (Li, 2006, p.8). However, the other six studies (Daiute, 1986; Harris, 1985; Hawisher, 1987; Joram, Woodruff, Bryson, & Lindsay, 1991; Lutz, 1987; Womble, 1984) indicate that computer-assisted word processing does not lead to better higher-level revisions. Rather, using word processors, students have revised more at a superficial level, i.e. "revisions at the word or character level" and "single-word revisions that affect grammar and mechanics" (Li, 2006, p.8).

Based on the above-early studies on the use of word processors and pen-and-paper, a number of criticisms have been raised regarding the research design. Suggested research design flaws include the following: in a number of studies (e.g., Dalton & Hannafin, 1987; Lichtenstein, 1996; Teichman & Poris, 1989) the researchers forced students who were skilled in writing with computers to compose with pen-and-paper for the sake of data collection, whereas students who were novice users of word processors were asked to compose on computers. Second, using thinking aloud protocols as a research tool could be problematic, since many students tend to say what they think the instructors or researchers would like to hear (Stratman and Hamp-Lyons, 1994). Moreover, some thinking processes are automatic, so that students may not be able to articulate in words the "inner speech" of their thought processes (Ericsson & Simon, 1984; Vygotsky, 1978). This type of thinking-aloud assessments becomes more problematic if students are ambiguous in their utterances. Third, although the English-as-a-second-language (ESL) students in most of the studies were described as having "intermediate" English language proficiency, such English language proficiency was not always explicitly mentioned. Even when it was mentioned, the proficiency measures were not clearly defined (e.g., Li, 2006; Li & Cumming, 2001; Owston & Wideman, 1997). Last, it was inappropriate to ask the ESL undergraduates to write an essay using questions from TOEFL Test-of-Written-English (TWE), because many of them have taken the test or practiced for it before they entered their university programmes (see Li, 2006). Besides, the TWE questions were unlikely to motivate students since they tend to be around topics perceived as somewhat outdated or irrelevant by the undergraduates. It is worthy of note that, Li (2006), in his study, did not state the venue where he conducted the writing task and did not set a time limit for the writing sessions. As a result, it is difficult to determine the time that students spent on the task, and whether additional assistance was available to the students (e.g., if the writings were done at home).

3. Directions for future research

Future research studies should aim to investigate the effects of writing with computers and traditional writing with pen-and-paper on students' higher-order thinking processes, higher-level revisions, quality of written work, and their attitude toward the writing task. To address the problems mentioned above, the future researchers only invite experienced word processing users to take part in the study. Instead of conducting thinking-aloud protocols, they should consider using interviews. The English language proficiency of the participants will be carefully documented. The researchers should clearly define terms such as 'intermediate', 'low intermediate' or 'post intermediate'. They should engage the participants in a meaningful task, namely a graded in-class reflection, which will constitute part of the course assessment. I propose that a future research study can be conducted in Singapore. The proposed study comprises the following three novel features. First, the researchers compare the effects of using computers versus traditional pen-and- paper on the writing of first-year pre-service student-teachers based in Asia who use English as the first language. This target population has never been investigated in previous evidence-based research. Second, the participants will be taught techniques for writing revisions before they will be asked to carry out the in-class graded reflections. This method will enhance the student participants' intention to communicate with readers (i.e. higher-order thinking skills, see Bereiter & Scardamalia, 1987; Li, 2006) and to engage in higher-order revisions (i.e. revisions at or above the phrase level, see Li, 2006). Third, researchers will collect both quantitative and qualitative data to understand comprehensively the impacts of the use of computers and traditional pen-and-paper on the following four aspects of writing: (i) students' higher-order thinking processes, (ii) their higher-level

revisions, (iii) the quality of their writing, and (iv) their attitudes toward the written task. The study may be conducted in the context of a writing course, because “the use of word processing in student writing has become increasingly commonplace, and the need to understand its impact on the processes and written products is made more pressing (Owston, Murphy, and Wideman, 1992, p. 249)”. It is believed that this proposed project will help advance our understanding of the theory and practice of fourth-generation writing assessment from the technological, humanistic, political, and ethical perspectives (Hamp-Lyons, 2001). It is “technological” because students who use computers for assessment can perform repeated functions (e.g., copying and pasting texts, and checking spelling and grammar) without boredom. It is “humanistic” because the authorial voices of students towards computers versus paper-and-pen modes can be heard, through interview with students. It is “political” because tests and other forms of writing assessment “impact the curriculum, the teaching materials, and the teaching methods teachers use” (Hamp-Lyons, 2001, p. 123). Finally, “ethical” means that the students have “the responsibility to use all means available to make any language tests they are involved in as fair as possible” (Hamp-Lyons, 2001, p. 124). Specifically, the proposed project may contribute to new and important knowledge construction in aspects including technologically-fronted assessment that impacts the curriculum, and fairness of writing tests and its effects on students.

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